

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claims 1-18 (cancelled)

Claim 19 (Previously Presented): A surface defect inspecting method comprising the steps of:

irradiating an irradiation light having a predetermined pattern on an inspection target surface;

imaging the surface irradiated with the irradiation light; and

inspecting the inspection target surface based on an obtained image of the inspection target surface,

wherein the irradiation light irradiated from an irradiation face has a mesh-like pattern including meshes of a same shape, each mesh having an irradiation area smaller than a non-irradiation area in a plane normal to an optical axis; and

the inspection target surface is inspected based on lightness/darkness information of an image area in the obtained image corresponding to a non-irradiated area in the inspection target surface.

Claim 20 (Previously Presented): The surface defect inspecting method according to claim 19, wherein if an image obtained is a normal obtained image when the irradiation light is irradiated on a normal inspection target surface and a brightness of the irradiation area in the normal obtained image is defined as a high brightness whereas a brightness of the non-irradiation area is defined as a low brightness; then,

an intermediate brightness area which is present within the obtained image and which is an area of intermediate brightness between the high brightness and the low brightness is used as a target area.

Claim 21 (Previously Presented): The surface defect inspecting method according to claim 19, wherein an image area corresponding to the irradiation area in the inspection target surface is extracted as continuous light areas, and the continuous light areas are precluded from a target area.

Claim 22 (Previously Presented): The surface defect inspecting method according to claim 19, wherein the image area corresponding to the non-irradiated area of the inspection target surface is extracted for each enclosed dark area, and if an isolated light area is present within the enclosed dark area, the isolated light area is determined as a target area.

Claim 23 (Previously Presented): The surface defect inspecting method according to claim 19, wherein in case the inspection target surface is a curved surface, the mesh-like distribution of the irradiation light from the irradiation face corresponding to a shape of the curved surface of the inspection target surface is set as a circular or a regular polygonal mesh-like pattern in the obtained image.

Claim 24 (Previously Presented): A surface defect inspecting apparatus comprising:

an irradiating means for irradiating an irradiation light having a predetermined pattern on an inspection target surface;

an imaging means for imaging the inspection target surface irradiated with the irradiation light; and

an image processing means for effecting an image processing on an image obtained by the imaging means,

wherein the irradiating means irradiates, from an irradiation face thereof, an irradiation light having a mesh-like pattern including meshes of a same shape, each mesh having an irradiation area smaller than a non-irradiation area in a plane normal to the optical axis; and

the image processing means, in the image processing, processes lightness/darkness information of an image area corresponding to a non-irradiated area in the inspection target surface.

Claim 25 (Previously Presented): The surface defect inspecting apparatus according to claim 24, wherein if an image obtained is a normal obtained image when the irradiation light is irradiated on a normal inspection target surface and a brightness of the irradiation area in the normal obtained image is defined as a high brightness whereas a brightness of the non-irradiation area is defined as a low brightness; the image processing means includes an intermediate brightness area extracting means for extracting an intermediate brightness area which is present within the obtained image and which is an area of intermediate brightness between the high brightness and the low brightness.

Claim 26 (Previously Presented): The surface defect inspecting apparatus according to claim 24, wherein the irradiation light of the irradiating means is formed by a plurality of light emitting elements distributed in a mesh-like pattern.

Claim 27 (Previously Presented): The surface defect inspecting apparatus according to claim 24, wherein the irradiation light of the irradiating means is formed through transmission between narrow slits distributed in a mesh-like pattern.

Claim 28 (Previously Presented): The surface defect inspecting apparatus according to claim 24, wherein in correspondence with a curved surface shape of the inspection target surface, the mesh-like distribution of the irradiation light from the irradiation face corresponding to the curved surface shape of the inspection target surface is set as a circular or a regular polygonal mesh-like pattern in the obtained image.

Claim 29 (Previously Presented): A surface inspecting apparatus comprising:

a plurality of light emitting elements arranged in a predetermined layout pattern;

an imaging camera for imaging an inspection target surface irradiated with an irradiation light of the light emitting elements; and

an outputting portion for outputting obtained image information of the imaging camera,

wherein the layout pattern comprises a continuous arrangement of the light emitting elements thereby leaving a dark face of a predetermined shape therewithin; and the imaging camera is disposed so as to receive, on at least one dark face, the irradiation light of each light emitting element reflected off the inspection target surface.

Claim 30 (Previously Presented): The surface defect inspecting apparatus according to claim 29, further comprising a defect evaluating portion for detecting a defect on the inspection target surface by evaluating an output signal from the outputting portion.

Claim 31 (Previously Presented): The surface defect inspecting apparatus according to claim 29, wherein the layout pattern comprises a repetitive pattern which repeats itself along a predetermined direction.

Claim 32 (Previously Presented): The surface defect inspecting apparatus according to claim 29, further comprising a conveying mechanism for moving the inspection target surface along a direction relative to the plurality of light emitting elements and the imaging camera;

wherein a direction of repetition of the layout pattern comprises the direction of relative movement.

Claim 33 (Previously Presented): The surface defect inspecting apparatus according to claim 29, wherein a light emitting face of the plurality of light emitting elements and an imaging face of the imaging camera are present in a common plane.

Claim 34 (Previously Presented): The surface defect inspecting apparatus according to claim 29, further comprising a defect evaluating means for evaluating an output signal from the imaging camera, thus detecting a defect present on the inspection target surface;

wherein the defect evaluating means includes an isolated point extracting portion for determining, as a defect candidate, a prominent brightness area isolated

in a lightness/darkness image of the inspection target surface generated from the output signal, and a defect candidate discriminating portion operable to preclude, from the defect candidates, the defect candidate contained within an area indicative of light emitting images of the continuously arranged light emitting elements in the lightness/darkness image.

Claim 35 (Previously Presented): The surface defect inspecting apparatus according to claim 34, further comprising a preprocessing portion for effecting an image processing such that a brightness level of the continuous light emitting image area in an actual inspection substantially agrees with a brightness level of a light emitting image of the continuously arranged light emitting elements obtained from a normal inspection target surface, the brightness level of the light emitting image obtained from a normal inspection target surface being employed as a reference for generating the lightness/darkness image from the output signal of the imaging camera.

Claim 36 (Currently Amended): The surface defect inspecting apparatus according to claim 35, wherein a peripheral area including the prominent brightness area precluded from the defect candidate and an unnecessary image area ~~such as a background~~ are integrated and masked as a defect determination non-target area ~~relative to the obtained image; and a masking operation is effected by determining an isolated point area precluded from the defect candidate together with an unnecessary image area such as a background as defect determination non-target area.~~